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Grasses of New Hampshire I. Tribes Poeae (Festuceae) and Triticeae (Hordeae)

by

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ABSTRACT

This paper is a taxonomic treatment of all grass species of the tribes Poeae (Festuceae) and Triticeae (Hordeae) occurring native or naturalized in New Hampshire. The treatment includes keys to tribes, genera, and species, distribution maps, illustrations, habitat information and notes on nomenclature and taxonomic problems.

Key words: grasses, Gramineae, Poaceae, tribe Poeae, tribe Festuceae, tribe Triticeae, tribe Hordeae, New Hampshire flora, taxonomy, systematics.

GRASSES OF NEW HAMPSHIRE

I. Tribes Poeae (Festuceae) and Triticeae (Hordeae)

by

A. R. Hodgdon, G. E. Crow, F. L. Steele[1]

Introduction

The grass family is the most economically important group of plants in the world. Grasses have long provided the human race with a primary source of food and shelter and with forage for domestic animals. Our most useful cultivated grasses are of Old World origin with the exception of corn or maize *(Zea mays)* and perhaps some native Bluegrass (Poa) and Bent grasses *(Agrostis)* which have been bred with Eurasian plants to produce better turf and pasture grasses for domestic purposes.

When early settlers arrived in New Hampshire most of the state was wooded and the native grasses were sparse, except for those growing in the salt marshes. Inland native grasses largely occurred in sites such as open swamps, riverbanks, old beaver dams, ledges, and openings in woods caused by blowdowns or fires and a few other limited habitats and are primarily confined to these sites today. None of the native grasses had valuable grains (except for the rare *Zizania aquatica),* although some were useful for forage.

With settlement of the region came clearing of a great deal of land for farming and numerous useful grasses were introduced from Europe. Many of the valuable cultivated grasses and various weedy species, unintentionally introduced, have come to reproduce naturally and have spread to disturbed places such as roadsides, old fields and waste places. Some have become noxious garden weeds.

The grass flora of New Hampshire thus consists of native species and a rather large number of European species, many widespread in distribution. In the less developed regions of the state, such as forests, swamps, salt marshes, rock ledges and alpine areas, the native species prevail with only occasional introduced species. In more developed regions of the state the introduced species predominate while the native grasses are generally confined to more specialized, untouched habitats.

The distribution of native species of grasses generally reflects ecological requirements or availability of specialized habitats. The distribution of Cordgrasses *(Spartina alterniflora* and *S. patens)* is clearly correlated with the distribution of salt marshes. Freshwater marshes and swamps, if not densely wooded, are inhabited by various species of *Glyceria.* Moist or poorly drained open areas are good sites for *Calamagrostis canadensis.* River ledges furnish

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suitable sites for a few species such as *Sphenopholis intermedia.* Alluvial woods and flood plains along slow-moving rivers have various species such as *Elymus virginica.* Rich woods, though often devoid of grasses, may occasionally contain *Milium effusum* and *Leersia virginica.* In woods of secondary growth which have been extensively logged species with weedy tendencies such as *Danthonia spicata* are found. *Hystrix patula* frequently occurs in woods with talus slopes or cliffs while *Agropyron trachycaulum* is generally found on more open ledges or talus.

For some species there is a notable correlation with elevation. An elevation of 1000 feet seems to be the limit for White Oak *(Quercus alba)* and the Hickories *(Carya)* in New Hampshire and likewise appears to be the limit for some grasses such as *Oryzopsis racemosa* and *Panicum spretum.* The upper limit of the hardwood forest is generally 2000 feet elevation and *Cinna latifolia* and *Muhlenbergia sylvatica* are examples of grasses that do not occur above the upper limit of this zone. A coniferous forest of Red Spruce *(Picea rubens)* and Balsam Fir *(Albies balsamea)* is characteristic between 2000 feet and 4500 feet and few grasses are contained therein. However, in open areas, particularly ledges, *Deschampsia flexuosa* and *Agrostis borealis* often occur. Above treeline one may encounter *Hierochloe alpina* and *Poa glauca.*

The introduced grasses are most commonly encountered on present or former farm lands. The European grasses most frequently planted for forage were the Brome grasses (especially *Bromus inermis*), Fescues *(Festuca),* Bluegrass *(Poa pratensis),* Timothy *(Phleum pratense)* and Redtop *(Agrostis stolonifera).* The commonest weedy grasses are Quack Grass *(Agropyron repens)* and Orchard Grass *(Dactylis glomerata).* Such introductions readily spread to roadsides and disturbed areas.

The predominance of introduced grass species in New Hampshire is much less than in earlier times. During the nineteenth and early twentieth centuries fields and pastures were much more extensive than now and sheep farming and manufacturing of woolen goods was common in settled areas. Such species as *Eragrostis minor, Agropyron smithii, Bromus arvensis, Hordeum brachyantherum* and *Sporobolus neglectus* were collected along railroads, roadsides and wool waste dumping places but no longer appear to be present in the state's grass flora.

The salting of roads in winter appears to be having some impact on the distribution of some roadside grasses. Cord Grass *(Spartina pectinata),* a salt tolerant species, shows indications of somewhat rapid spreading along our highways, tending to replace less tolerant species. Reed Grass *(Phragmites australis)* also seems to be spreading along highways where construction has impeded drainage. This native grass which frequently inhabits brackish waters along the coast is also tolerant of highway salting.

A policy has been recently established calling for the planting of fast growing grasses, usually Winter Rye *(Secale cereale),* to help stabilize roadside embankments of newly constructed sections of highway. This species tends to die out after a year or two but may persist a little longer. Various cultivars of the forage grasses and turf grasses planted in pastures, golf courses and lawns may spread to a limited extent. Some of these may become established locally while others tend to disappear after a few years.

There are some species of grasses whose place of origin cannot be clearly determined. The natural occurrence of Wild Rice *(Zizania aquatica)* in New Hampshire is in question. The state is located within the natural range of the

plant and Pease (1964) regarded it as being native but rather local in occurrence. However, he also notes that this valuable wildfowl food had been planted in Lake Umbagog sometime around 1920 for ducks. Other attempts to establish viable colonies in shallow bodies of water have been made by wildlife groups for many years. Some have survived and spread. Thus, it is difficult to determine whether a particular colony is truly native.

Some species such as Red Fescue *(Festuca rubra),* Redtop *(Agrostis stolonifera)* and Quack Grass *(Agropyron repens),* whose present-day distributions are circumboreal, sometimes grow in undisturbed habitats along the coast of Maine and eastern Canada and may appear to be native. Quack Grass is an introduced species which has been able to become established in some undisturbed sites. Red Fescue is native, but many European varieties are used in seed mixtures for pastures in northern regions and thus there is some intergradation between the native and introduced races. As to the status of Redtop as a native, this is simply unknown. Some authors such as Hitchcock (1935, 1951) feel it is native while others such as Hultén (1962) regard it as introduced to North America.

This work attempts to include all native species of grasses of the state and those introduced species which have become naturalized. All introduced species which show a tendency to persist or spread from cultivation are also included. Introduced species which have not been collected in the last 50 years do not appear to be constituents of the present flora and have been omitted from the treatment.

The habitat, distribution and state of abundance of each grass are given, although it must be recognized that many grasses may occur in varying habitats. Where species occur widely throughout the state they may be presumed to grow in most of the towns. Others are of limited distribution either because of the infrequent occurrence of specialized habitats or because ecological requirements confine them to certain parts of the state. Species with limited distributions have been mapped. The maps are based on herbarium material and field work. The most extensive collecting has been done in Coos County by Pease and in Strafford County by Hodgdon. Thus, some maps may show a degree of bias toward these two counties. The least collecting has been done in Belknap and Sullivan Counties. Field studies have included introduced species and all native species except *Eragrostis hypnoides, E. minor, Triplasis purpurea, Sporobolus cryptandrus* and *Panicum longifolium.*

In general the treatment follows *Gray's Manual of Botany* (Fernald, 1950) in an effort to facilitate reference to it and to other standard floristic works. Thus, circumscription of traditional tribes is maintained. Much modern research has led to considerable alteration of subfamilial and tribal concepts and the reader is referred to *Grass Systematics* (Gould, 1968) for a thorough, well documented modern treatment of grasses occurring in the United States. Notation of Gould's assignment of genera is made when differing from the traditional.

All varieties of grasses recognized in *Gray's Manual* which are said to occur in our range have been carefully evaluated and only those taxa which can clearly be recognized at the infraspecific level have been included. Varietal distinctions among introduced species are difficult to discern outside their natural range due to hybridization, introgression and domestication. Thus, infraspecific distinctions have not been attempted within alien species in this treatment.

Key to Tribes

A. Spikelets laterally compressed with midrib or keel as an axis; spikelets with 1-several fertile florets
  B. Spikelets unisexual, lower branches of inflorescence staminate; glumes absent ..... ZIZANIEAE *(Zizania aquatica)*
  B. Spikelets perfect; glumes present or absent
    C. Spikelets strongly flattened, containing 1 floret ..... ORYZEAE *(Leersia)*
    C. Spikelets not strongly compressed, florets 1-several
      D. Spikelets in 2 rows along one side of the rachis, forming 1-sided spikes ..... CHLORIDEAE
      D. Spikelets not forming 1-sided spikes *(Nardus* of Triticeae appearing 1-sided, lacks glumes)
        E. Spikelets sessile, 2-ranked from opposite sides of the rachis, forming simple spikes ..... TRITICEAE (HORDEAE)
        E. Spikelets pedicelled, not forming simple spikes (some species with spike-like inflorescences but spikelets not sessile)
          F. Glumes shorter than the lowest floret ..... POEAE (FESTUCEAE)
          F. Glumes (at least 1) longer than the lowest floret
            G. Spikelets containing 2 or more perfect florets (staminate or sterile florets, if present, above the perfect) ..... AVENEAE
            G. Spikelets containing 1 perfect floret (staminate or sterile florets below it)
              H. Spikelets lacking staminate or sterile florets below the perfect floret .... AGROSTIDEAE
              H. Spikelets with staminate or sterile florets below the perfect floret ..... PHALARIDEAE

A. Spikelets dorsally compressed with keel or midrib in middle of flattened side; spikelets with 1 fertile floret
  I. Spikelets of unisexual florets, staminate or pistillate, not both (pistillate flowers in "ears") ..... TRIPSACEAE *(Zea mays)*
  I. Spikelets of perfect florets or perfect and staminate, but lacking pistillate florets
    K. Spikelets paired at each joint of the rachis, of 2 kinds, one sessile with a perfect floret, the other a hairy pedicel with or without a staminate floret (rarely with 2 stalked florets) ..... ANDROPOGONEAE
    K. Spikelets mostly 1 at each joint of the rachis, all alike, florets perfect
      L. Spikelets with perfect floret below and a sterile lemma resembling the second glume above; glumes falling off with mature fruiting spikelets ..... PANICEAE
      L. Spikelets with 1 perfect floret, lacking a sterile lemma; glumes persistant after mature spikelets fall off ..... AGROSTIDEAE *(Milium)*

I. POEAE (FESTUCEAE)

A. Plants large, coarse reeds, 2-6 m tall; inflorescence plume-like; rachis bearded with long silky hairs equaling or exceeding lemmas ...15. *Phragmites*
A. Plants less robust, seldom exceeding 1.5 m tall; inflorescence various; rachis lacking beard or if bearded then hairs short
  B. Spikelets in dense spike-like panicles
    C. Panicles appearing 1-sided; spikelets crowded into asymmetrical clusters, somewhat flattened laterally ..... 9. *Dactylis*
    C. Panicles more or less symmetrical; spikelets not in densely crowded clusters, symmetrical
      D. Spikelets 8-16-flowered, all fertile; saltmarshes .... 14. *Distichlis*
      D. Spikelets 2-3-flowered, terminal spikelets fertile, lower ones sterile; old fields ..... 13. *Cynosurus*
  B. Spikelets in more open panicles, sometimes contracted but not spike-like
    E. Lemmas 2-toothed or 2-lobed at apex
      F. Nodes densely bearded; mature culms readily breaking at node ..... 12. *Triplasis*
      F. Nodes glabrous; mature culms not readily breaking
        G. Nerves of lemmas heavily bearded with long divergent hairs; leaf sheaths open ..... 11. *Tridens*
        G. Nerves of lemmas glabrous or at least not bearded with long hairs; leaf sheaths closed
          H. Awns of lemmas divergent ..... 2. *Schizachne*
          H. Awns of lemmas straight or lacking ..... 1. *Bromus*
    E. Lemmas entire at apex
      I. Lemmas 3-nerved
        J. Glumes and lemmas green and herbaceous; ligule a membranous scale ..... 7. *Poa*
        J. Glumes and lemmas thin and dry, pale to red; ligule a fringe of hairs ..... 10. *Eragrostis*
      I. Lemmas 5- or more nerved
        K. Spikelets nearly as broad as long, or broader; lemmas with broad scarious margins ..... 8. *Briza*
        K. Spikelets longer than broad; lemmas lacking broad scarious margins
          L. Lemmas keeled with a prominent dorsal ridge..7. *Poa*
          L. Lemmas rounded on back, if keeled only at tip
            M. Lemmas with lateral nerves arched, converging at the midrib; mostly awned
              N. Annuals ..... 4. *Vulpia*
              N. Perennials ..... 3. *Festuca*
            M. Lemmas with lateral nerves nearly straight; awnless
              O. Leaf sheaths open; culms slender, weak and decumbent or prostrate ..... 5. *Puccinellia*
              O. Leaf sheaths closed; culms stout, erect ..... 6. *Glyceria*

1. BROMUS Brome Grass

Plants often single or few stemmed; inflorescence frequently nodding; spikelets large with lemmas usually awed; leaves with broad flat blades, sheaths mostly closed. Native and introduced grasses of wide distribution and one important forage grass, *B. inermis*.

A. Perennials.
  B. Lower glumes with 3 prominent nerves; upper glumes with 5 prominent nerves ..... *B. kalmii*
  B. Lower glumes with 1 prominent nerve; upper glumes with 3 prominent nerves.
    C. Inflorescence with ascending or occasionally diverging branches; lemmas awnless or with awns up to 2.5 (-3.0) mm. Mostly cultivated fields ..... *B. inermis*
    C. Inflorescence with branches diverging to flexuous, drooping at maturity; lemmas with awns 3 mm or longer. or longer.
      D. Margins of lemmas pilose up to at least the middle, backs glabrous. Common. ..... *B. ciliatus*
      D. Margins of lemmas pilose only at base, backs pubescent or less frequently glabrous.
        E. Sheaths overlapping with 2 cartilaginous auricles at summit; sheaths of upper leaves longer than internodes, covering the nodes ..... *B. latiglumis*
        E. Sheaths open, V-shaped, auricles lacking at summit; sheaths of upper leaves shorter than internodes, exposing the nodes ..... *B. pubescens*

A. Annuals; uncommon introduced weeds of fields or waste places.
  F. Lower glume with 1 prominent nerve; 2nd glume with 3 prominent nerves ..... *B. tectorum*
  F. Lower glume with 3 prominent nerves; 2nd glume with 5-9 nerves
    G. Pedicels shorter than spikelets ..... *B. mollis*
    G. Pedicels as long as or longer than spikelets
      H. Sheaths glabrous; awns short or lacking, 0-6 mm long ..... *B. secalinus*
      H. Sheaths pubescent; awns longer, 3-12 mm long
        I. Branches of panicle erect or ascending... *B. racemosus*
        I. Branches of panicle flexuous, slightly spreading ..... *B. japonicus*

1. *B. latiglumis* (Shear) Hitchc. (figure 1) Brome Grass

Prennial. Grass of alluvial thickets. Frequent along the Connecticut River Valley; occasional along the Merrimack River Valley.

The name *B. purgans* has been applied to this taxon by Wagnon (1950), however, Voss (1972) rejects this name as a *nomen confusum* and the name has been formally proposed for rejection under the revised Article 69 of the *International Code of Botanical Nomenclature* following the Lenningrad Congress (McNeill, 1976).

2. *B. pubescens* Muhl. ex Willd. (figure 2) Canada Brome

Perennial. Rich or rocky woods. Southeastern N.H.; rare.

B. purgans of *Gray's Manual* (see Wagnon, 1950 for nomenclatural change).

3. *B. ciliatus* L. Fringed Brome

Perennial. Tickets, open woods and roadsides. Common throughout the state. Very variable in pubescence. Fernald (1950) recognized two varieties, var. *ciliatus* and var. *intonsus;* however there is considerable integradation between the two morphological extremes. We follow Wagnon's (1952) treatment and do not recognize infraspecific taxa. *B. Dudleyi* Fern. is also included in the species.

4. *B. kalmii* A. Gray (figure 5) Brome Grass

Perennial. Alluvial banks of large rivers, Connecticut and Merrimack River Valleys. Rare.

Baum (1967) notes that the name *B. purgans* should be applied to this taxon rather than to *B. latiglumis* or *B. pubescens.* But Voss (1972) has rejected the name as a *nomen confusum* and it has been formally proposed for rejection under Article 69 by McNeill (1976).

5. *B. inermis* Leyss. (figure 3) Smooth Brome

Rhizomatous perennial. Important forage grass, commonly planted in hayfields and frequently escaping. Throughout the state. Introduced from Europe and Siberia.

The following introduced annuals occur occasionally in gardens and waste places in the state and may not persist:

B. secalinus L., *B. japonicus* Thunb., *B. racemosus* L., *B. mollis* L. and *B. tectorum* L. (figure 4)

2. SCHIZACHNE False Melic

Large native grass; cespitose, stems erect, unbranched; spikelets large; lemmas with prominent awns from below the bifid apex.

Gould (1968) places the genus in the Tribe Meliceae.

1. *Schizachne purpurascens* (Torr.) Swallen (figures 6 and 7)

Cespitose perennial. Spikelets flushed with purplish color. Dry or rocky woods and ledges, ascending to alpine areas. Frequent in northern part of the state, rare southward.

3. FESTUCA Fescue

A rather large genus somewhat resembling *Bromus* but with plants tufted and inflorescences erect; lemmas often with prominent straight awns.

Some members of the genus, such as *F. ovina, F. capillata* and *F. rubra,* were formerly planted in hayfields where they persist. Some cultivars are used in lawn mixtures and frequently spread.

A. Spikelets with florets replaced by vegetative tufts (viviparous). Alpine. ..... *F. prolifera*

A. Spikelets with normal florets

B. Blades flat, 4-8 mm wide

C. Panicles diffuse; spikelets 3-7 mm long, 3-6-flowered ..... *F. obtusa*

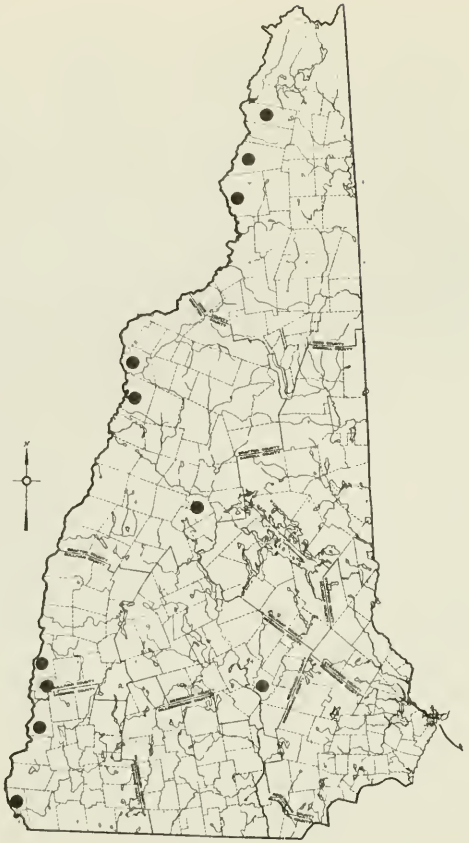

Figure 1
Bromus latiglumis

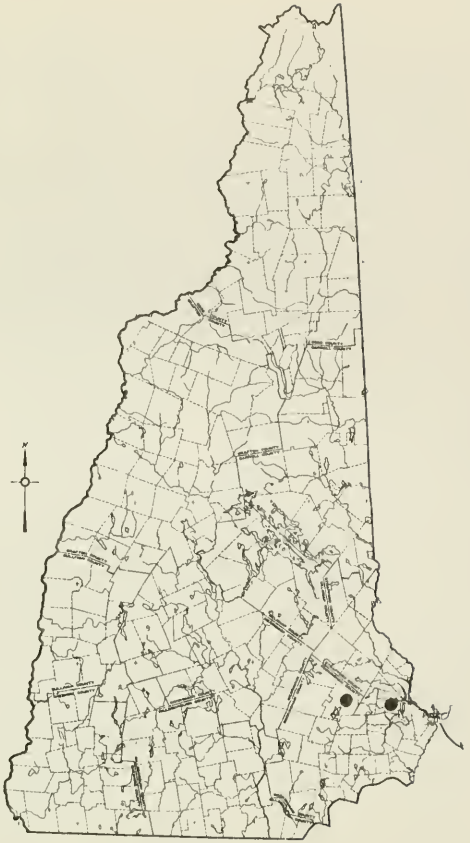

Figure 2
Bromus pubescens

Figure 3
Bromus inermis

Figure 4
Bromus tectorum

C. Panicles contracted; spikelets 8-12 mm long, 6-8-flowered ..... *F. pratensis*

B. Blades involute, less than 3 mm wide

D. Awns lacking or rarely present, then minute, up to 0.6 mm long ..... *F. capillata*

D. Awns present (0.5-) 1-2 mm long

E. Sheaths closed in younger leaves; sheaths of basal leaves shredding into fibers, red or purplish ...*F. rubra*

E. Sheaths open nearly whole length in younger leaves; sheaths of basal leaves not readily shredding, drab ..... *F. ovina*

1. *Festuca ovina* L. (figure 8) Sheep's Fescue

Perennial. Old fields and roadsides throughout the state; frequent. Introduced from Europe.

Coarser plants have been segregated as var. *duriuscula* (L.) W.D. J. Koch and our material appears to belong to this taxon.

2. *Festuca capillata* Lam. Hair Fescue

Perennial. Old fields and roadsides throughout the state; frequent. Introduced from Europe but believed to be native in Newfoundland and Nova Scotia (Fernald, 1950) and plants in Franconia at Eagle Cliff station may be also.

3. *Festuca rubra* L. Red Fescue

Perennial. Fields, roadsides swales, shores of coast and estuaries; common throughout N.H. Coastal populations native. Inland plants introduced from Eurasia.

Our native coastal plants belong to var. *rubra.* Variety *juncea,* with stiffish whitened leaves, may be distinct and has been collected from Star Island, Isles of Shoals. Numerous variants of this polymorphic species have been named and recognition of infraspecific taxa among non-native populations is further complicated by introductions of various cultivars which have spread.

4. *F. prolifera* (Piper) Fern. (figure 9) Prolific Fescue

Perennial. Moist alpine areas of Mt. Washington, Great Gulf and formerly in Alpine Garden. Rare.

This species is treated by some authors as *F. rubra* var. *prolifera* Piper.

5. *F. pratensis* Hudson (figure 11) Tall Fescue

Perennial. Fields and roadsides. Formerly planted as a forage grass. Introduced from Europe. (*F. elatior* L.)

6. *F. obtusa* Biehler. (figure 10)

Perennial. Rich woods, especially alluvial woods. Occasional along major rivers, rare elsewhere.

4. VULPIA Six-weeks-grass

A small genus resembling *Festuca* but differing in its annual habit. The genus is treated by some authors in *Festuca* as subgenus *Vulpia* (K. C. Gmel.) Hack.

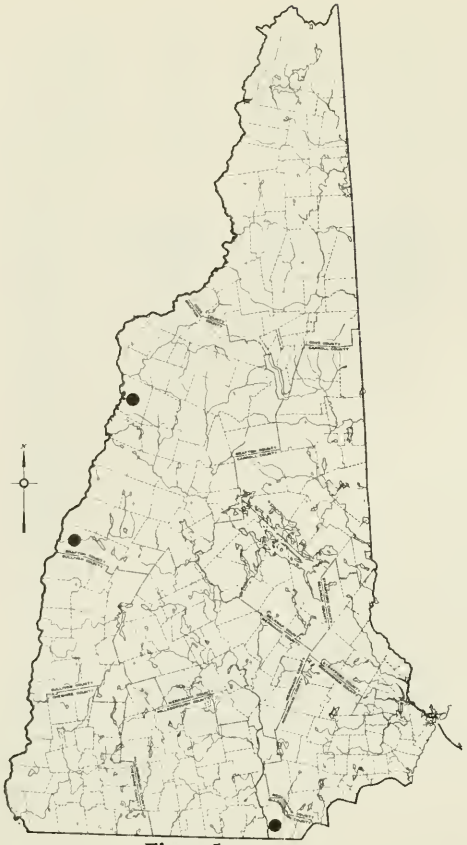

Figure 5
Bromus kalmii

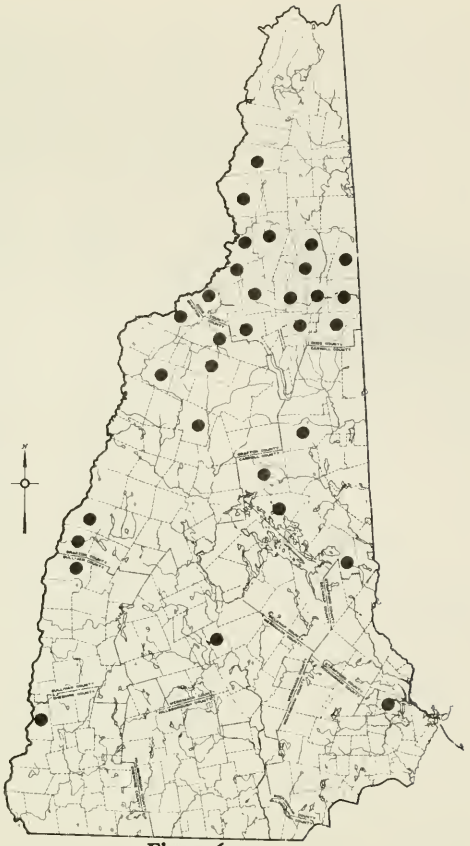

Figure 6
Schizachne purpurascens

Figure 7
Schizachne purpurascens

Figure 8
Festuca ovina

A. First glume 1/4-1/3 as long as the second; inflorescence only partially exserted from upper sheath ..... *V. myuros*
A. First glume 2/3-3/4 as long as the second; inflorescence well extended from upper sheath ..... *V. octoflora*

1. *V. octoflora* (Walter) Rydberg (figure 12) Common Six-weeks-grass
   Annual. Ledges and sandy shores. Southeastern N.H.; rare. Our plants belong to var. *tenella* (Willd.) Fern.
2. *V. myuros* (L.) K. C. Gmel. Rattail Six-weeks-grass
   Annual. Waste places. Southeastern N.H.; rare. Introduced from Europe.

5. PUCCINELLIA Alkali Grass

A small genus similar to *Glyceria,* mostly of wet sites, saline or freshwater. Plants with slender culms, weak and decumbent or procumbent; contracted panicles with small spikelets, awnless; lemmas rounded on back.

Two species treated by Fernald (1950) in *Glyceria (G. fernaldii* and *G. pallida)* are treated by Church (1949) in the genus *Torreyochloa* but are treated here in the genus *Puccinellia* (see Clausen, 1952; Voss, 1966).

A. Nerves of lemmas obscure
   B. Plants 1.5-10 dm tall; spikelets 5-12 mm long; lower glume 2.0-2.5 (3.0) mm long; upper glume (2.5) 3.0-4.0 (4.5) mm long; anthers 1.5-2.2 mm long ..... *P. maritima*
   B. Plants 0.2-4.5 dm tall; spikelets 3-7 mm long; lower glume 1.0-2.0 (-2.5) mm long; upper glume 1.5-2.5 (-2.8) mm long; anthers 0.5-1.0 mm long ..... *P. paupercula*
A. Nerves of lemmas prominent
   C. Plants 1-6 dm tall; blades 1-3.5 mm wide; spikelets 3-5 mm long; lemmas 2-2.8 mm long ..... *P. fernaldii*
   C. Plants 3-10 dm tall; blades 4-10 mm wide; spikelets 5-7 mm long; lemmas 2.5-3.5 mm long ..... *P. pallida*

1. *P. maritima* (Huds.) Parl. (figure 14)
   Perennial. Saltmarshes and brackish shores. Coastal N.H.; frequent.
2. *P. paupercula* (Holm.) Fern. & Weath. (figure 13)
   Perennial. Brackish shores. Seacoast region; rare.
   Our plants belong to var. *alaskana* (Scribn. & Merr.) Fern. & Weath.
3. *P. fernaldii* (Hitch.) E. G. Voss (figures 15 and 17)
   Perennial. Shallow water and wet open places. Throughout the state; occasional.
4. *P. pallida* (Torr.) Clausen (figure 16)
   Perennial. Shallow water and wet open places. Southeastern N.H.; occasional.

Figure 9
Festuca prolifera

Figure 10
Festuca obtusa

Figure 11
Festuca pratensis

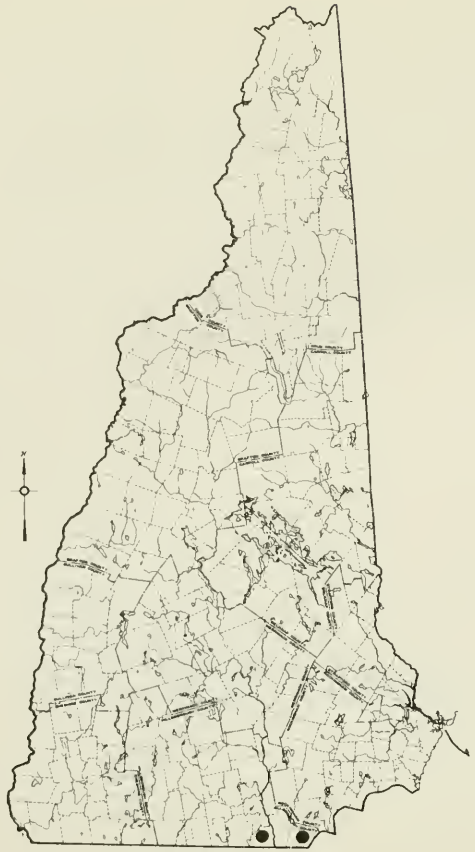

Figure 12
Vulpia octaflora

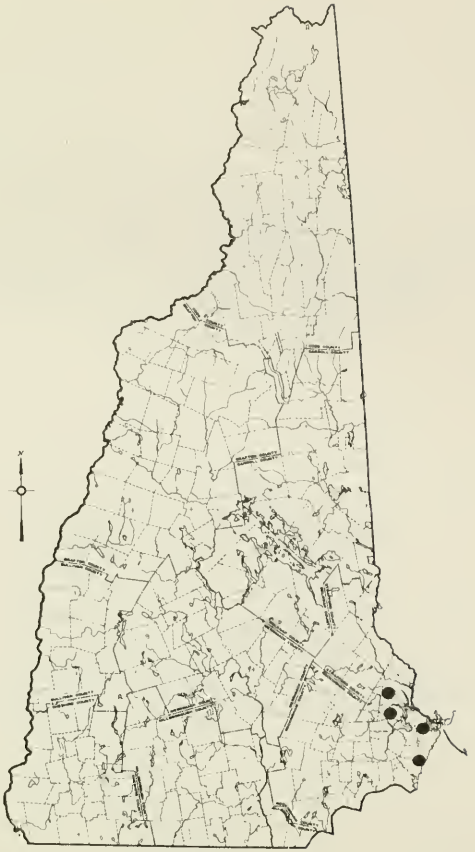

Figure 13
Puccinellia paupercula

Figure 14
Puccinellia maritima

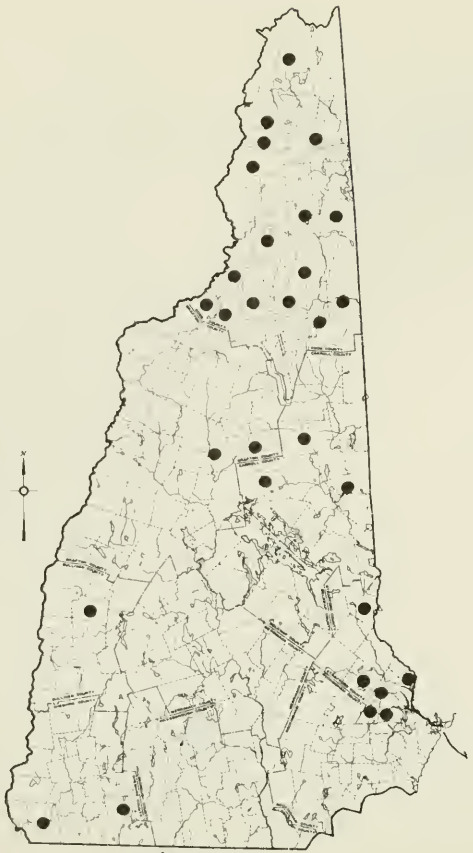

Figure 15
Puccinellia fernaldii

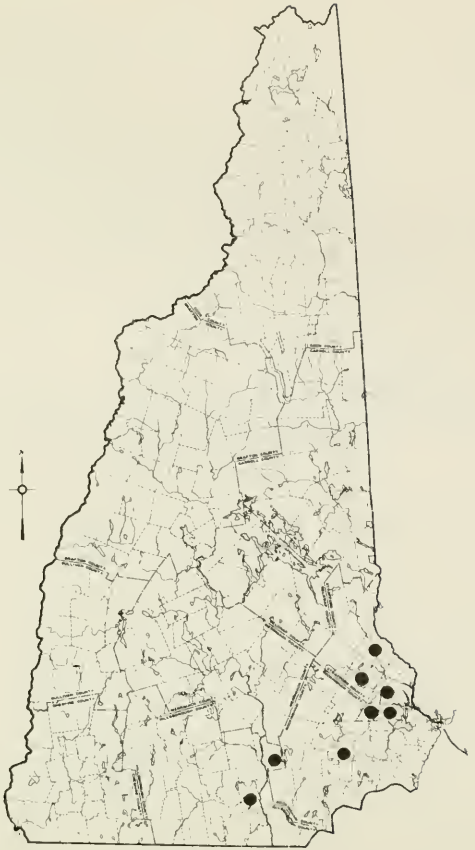

Figure 16
Puccinellia pallida

Figure 17
Puccinellia fernaldii

6. GLYCERIA Manna Grass

Large native grasses, mostly of wet places or aquatic. Rhizomatous with stout, erect stems; blades broad and flat, sheaths closed and often strongly 2-edged; spikelets small, awnless, several flowered; lemmas round on the back and with prominent nerves. The grains of some species are important food for waterfowl.

Gould (1968) places this genus in the Tribe Meliceae.

A. Spikelet linear, 10-40 mm long, nearly terete
  B. Lemmas obtuse to subacute, exceeded by palea ca. 0.5 mm ..... *G. borealis*
  B. Lemmas sharply acute, exceeded by the palea 1.5-2.5 mm ..... *G. acutiflora*

A. Spikelet ovate, 5 mm or less long, more or less compressed
  C. Panicles contracted; pedicels mostly equal or slightly longer than spikelets
    D. Panicles thick, compact ..... *G. obtusa*
    D. Panicles long and slender ..... *G. melicaria*
  C. Panicles open with spreading branches, lax; pedicels mostly much longer than spikelets
    E. Spikelets large, 3-5 mm wide; lemmas with veins conspicuous but not distinctly raised ..... *G. canadensis*
    E. Spikelets small, 1-2.5 mm wide; lemmas with prominent raised veins
      F. Upper glume less than 1.5 mm long; spikelets up to 4 mm long ..... *G. striata*
      F. Upper glume 2-2.5 mm long; spikelets 4-6 mm long ..... *G. grandis*

1. *G. borealis* (Nash) Batchelder (figure 19)

   Perennial. Quiet waters and less frequently in swamps. Throughout N.H.; frequent.

2. *G. acutiflora* Torrey (figures 18 and 20)

   Perennial. Shores and wet places. Southeastern N.H.; rare.

3. *G. melicaria* (Michx.) F. T. Hubbard

   Perennial. Wooded swamp and shores. Throughout N.H.; frequent.

4. *G. obtusa* (Muhl.) Trin. (figure 21)

   Perennial. Swales, open swamps and shores. Southeastern N.H.; infrequent.

5. *G. canadensis* (Michx.) Trin. Rattlesnake Manna Grass

   Perennial. Swales and wet places. Throughout N.H.; common.

   Variety *laxa* (Scribn.) Hitchc., a taller plant with somewhat smaller spikelets, occurs infrequently throughout the state. It appears to intergrade with var. *canadensis* and may not be deserving of varietal rank. (Treated by Fernald (1950) as *G. laxa* Scribn.)

6. *G. striata* (Lam.) Hitchc. var. *striata* Fowl Manna Grass

   Perennial. Mostly moist open sites, less common in open woods. Throughout N.H.; common.

   The more northern var. *stricta* (Scribn.) Fern., a shorter stiffer plant with lemmas having broad scarious tips, occurs frequently on Mt. Washington and has been recorded from Pittsburg.

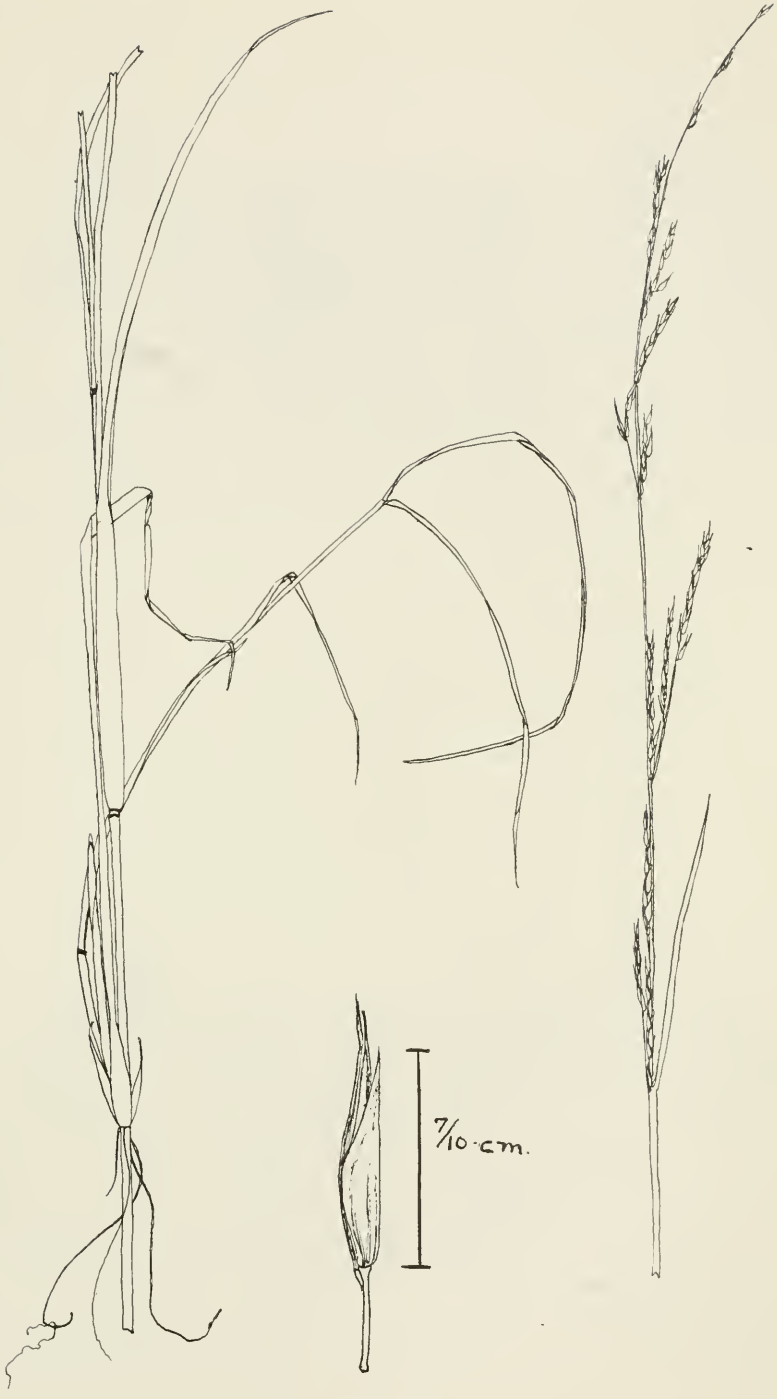

Figure 18
Glyceria acutiflora

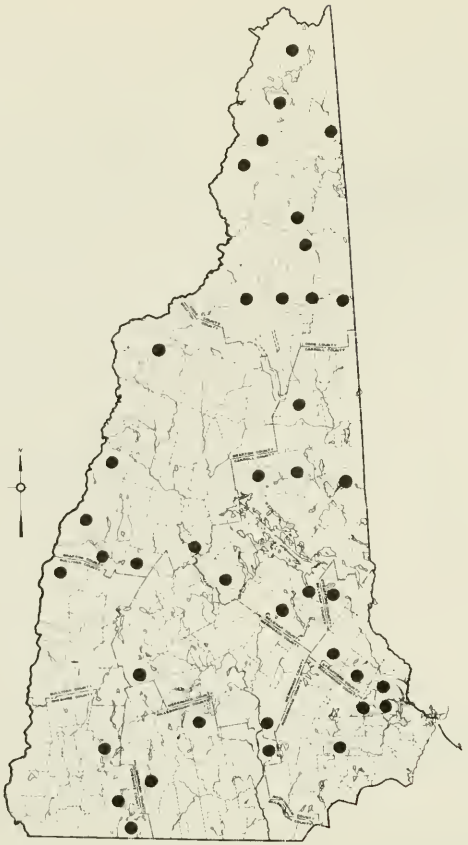

Figure 19
Glyceria borealis

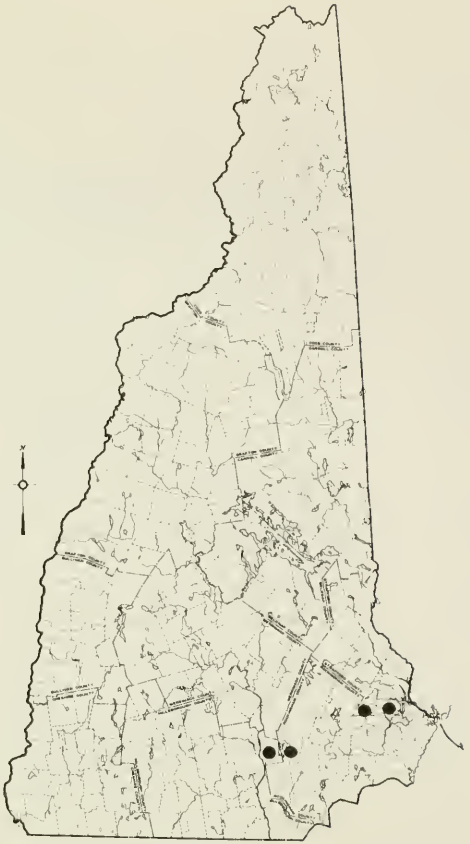

Figure 20
Glyceria acutiflora

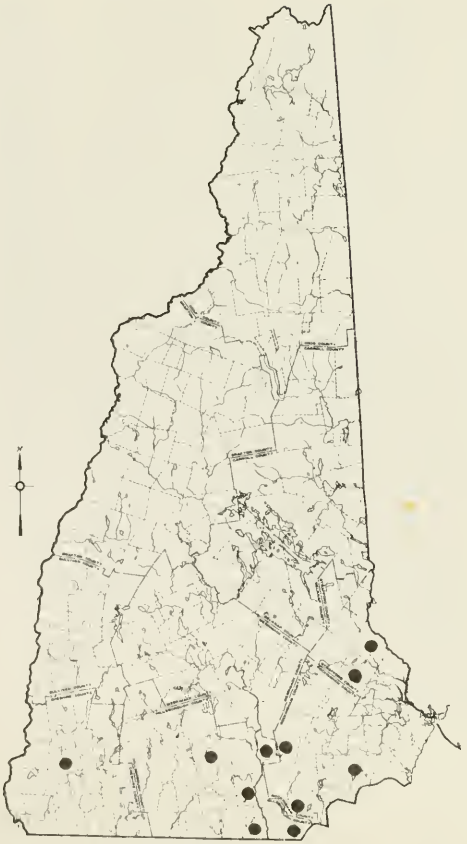

Figure 21
Glyceria obtusa

Figure 22
Glyceria grandis

7. *G. grandis* S. Watson (figure 22) Reed-meadow Grass

Perennial. Swales and wet woods. Throughout the state; common northward, infrequent southward.

7. POA Meadow Grass; Bluegrass

A large genus of annuals and tufted or rhizomatous perennials; flat blades ending in boat-shaped tips; spikelets small, often only 2-flowered; glumes keeled; lemmas keeled and distinctly nerved; awnless, usually with a tuft of cobwebby hairs at the base.

Two species, *Poa compressa* and *P. pratensis,* are commonly planted in hayfields, but the latter being principally used for lawns. *Poa annua* is a pesty weed in gardens, lawns and golf courses and is able to produce seed even under regular mowing.

A. Annual, lacking persistent old leaf bases of sheaths or offshoots ..... *P. annua*

A. Perennial, with persistent old leaf bases or sheaths or with offshoots

B. Plants with elongate rhizomes or geniculate basal offshoots

C. Plants lacking or sparce cobwebby tuft of hairs on callus at base of lemma; panicled mostly compact, spikelets crowded; culms flattened ..... *P. compressa*

C. Plants with conspicuous cobwebby tuft of hairs on callus at base of lemma; panicles mostly open, the branches flexuous, often spreading, with spikelets toward the tips; culms not flattened

D. Culms arising from old dried leaves, new tufts developing at tips of stolons or offshoots; alpine ..... *P. alpigena*

D. Culms bearing ascending tufts of new leaves from basal sheaths; disturbed sites at low elevations ..... *P. pratensis*

B. Plants more or less tufted, without rhizomes or conspicuous offshoots

E. Lemmas with 5 distinct nerves

F. Ligules of upper leaves mostly 2-5 mm long; keel of lemma scabrous to strongly pubescent ..... *P. trivialis*

F. Ligules of upper leaves mostly less than 2 mm; keel of lemma glabrous, smooth ..... *P. saltuensis*

E. Lemmas with 3 distinct nerves, the intermediate ones obscure

G. Plants low, mostly less than 4 cm; alpine or subalpine

H. Plant glaucous; panicles mostly erect and stiff ..... *P. glauca*

H. Plant green; panicles often nodding with thin flexuous branches ..... *P. fernaldiana*

G. Plants mostly taller than 5 cm, up to 1.5 m; lower elevations

I. Margins of lemmas pubescent

J. Ligules 1 mm or less long; panicles open, 5-15 cm long, branches spreading, lax ..... *P. nemoralis*

J. Ligules 2 mm or more long; panicles pyramidal to ellipsoid, 10-30 cm long, branches somewhat erect and stiffish ..... *P. palustris*

I. Margins of lemmas glabrous ..... *P. alsodes*

1. *P. annua* L. Annual Bluegrass

Annual. Weed of disturbed sites. Common throughout N.H. Introduced from Europe.

2. *P. compressa* L. Canada Bluegrass

Perennial. Planted in fields and pastures, becoming naturalized, escaping to dry ledges and dry open woods. Common throughout N.H.

3. *P. pratensis* L. Kentucky Bluegrass

Perennial. Extensively planted in pastures and especially lawns, becoming naturalized along roads, occasionally becoming established in natural habitats. Throughout N.H.; common.

Slender plants with narrow, involute leaves sometimes segregated as *P. angustifolia* are included here.

4. *P. alpigena* (Fries) Lindm. f. Alpine Bluegrass

Perennial. Alpine zone of Mt. Washington, local and occasional. Also reported from Mt. Clinton (Pease, 1964).

This taxon is considered by some to be a race of *P. pratensis* (Gleason, 1952).

5. *Poa trivialis* L. (figure 24)

Perennial. Open woods and wet places. Throughout the state; occasional.

6. *P. saltuensis* Fern. & Wieg. (figure 25)

Perennial. Deciduous woods and stream banks. Frequent in northern N.H., becoming rare southward.

Plants with smaller spikelets treated by Fernald (1950) as var. *microlepis* Fern. & Wieg. do not separate out as a distinct taxon.

7. *P. alsodes* A. Gray (figure 26)

Perennial. Deciduous woods and stream banks. Frequent in northern N.H., becoming rare southward.

8. *P. nemoralis* L. (figure 27)

Perennial. Mostly open sites, roadsides and meadows. Northern N.H.; infrequent. Introduced from Europe. May be confused with *P. palustris* or *P. glauca*.

9. *P. palustris* L. (figure 28)

Perennial. Mostly wet sites of open woods, riverbanks, meadows and roadsides. Throughout N.H.; frequent.

10. *P. glauca* Vahl (figure 29)

Perennial. Open moist to dry areas, mostly alpine. Northern N.H.; frequent in Presidential Range, rare elsewhere.

11. *P. fernaldiana* Nannf. (figure 30)

Perennial. Mostly alpine areas. Northern N.H.; frequent in Presidential and Franconia Ranges, rare elsewhere.

Figure 23
Poa pratensis

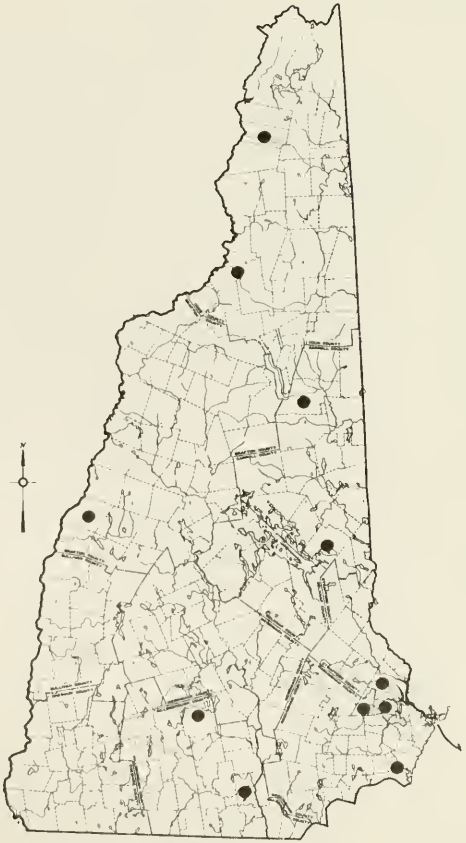

Figure 24
Poa trivialis

Figure 25
Poa saltuensis

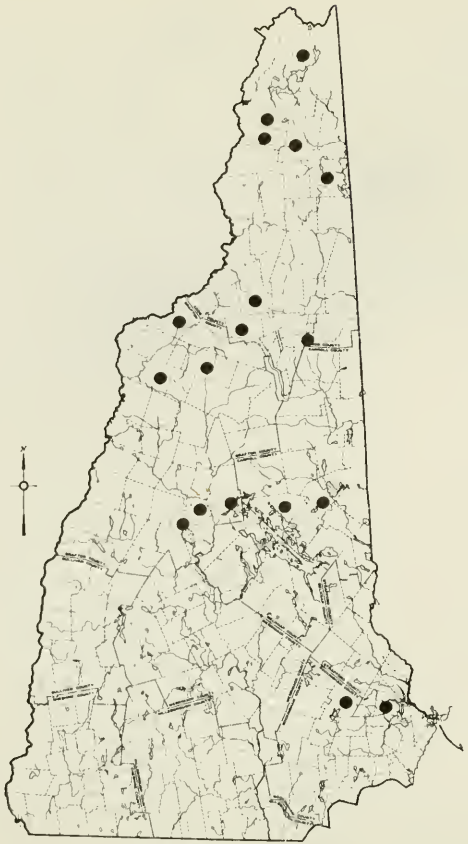

Figure 26
Poa alsodes

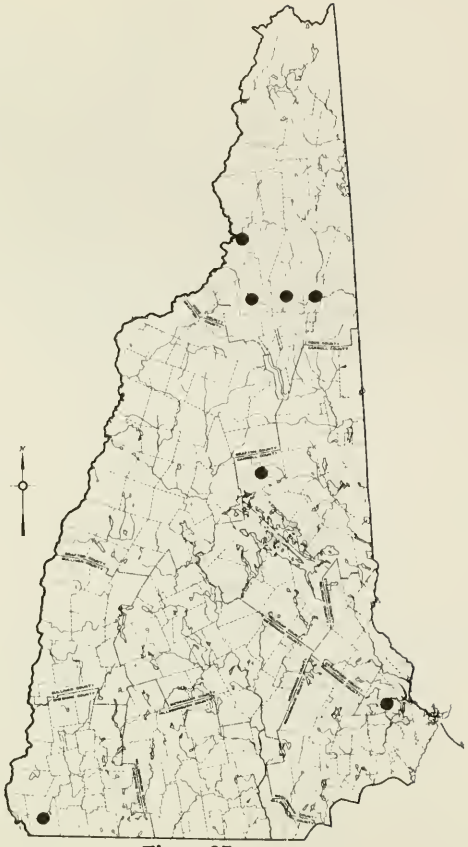

Figure 27
Poa nemoralis

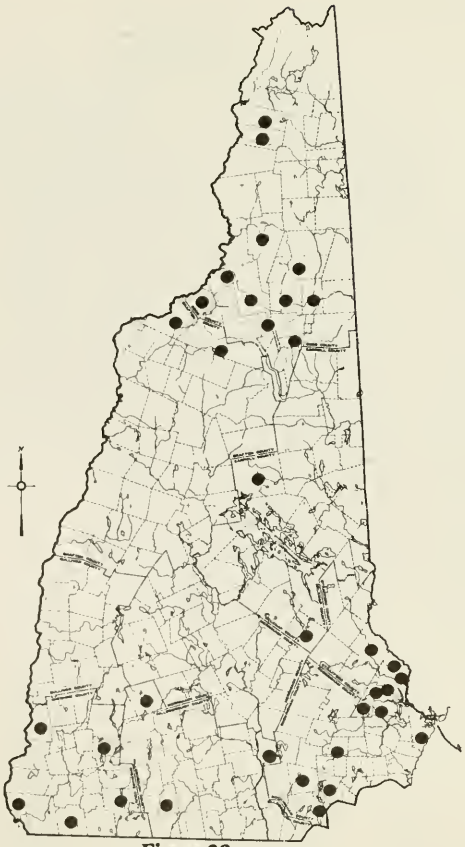

Figure 28
Poa palustris

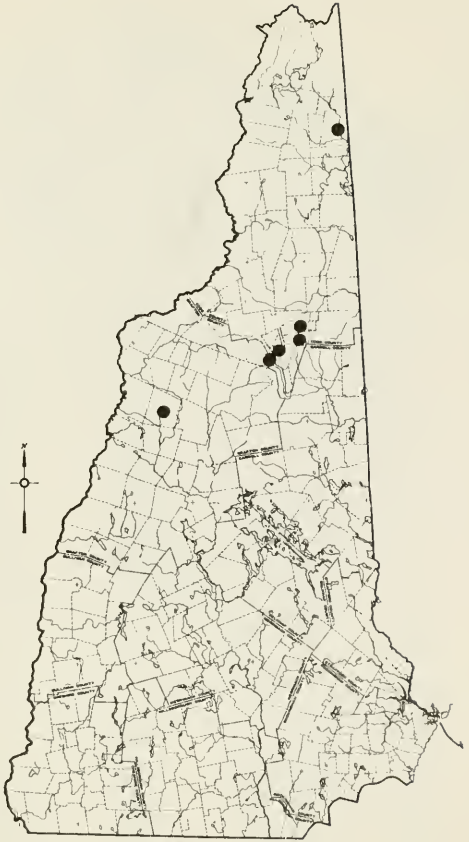

Figure 29
Poa glauca

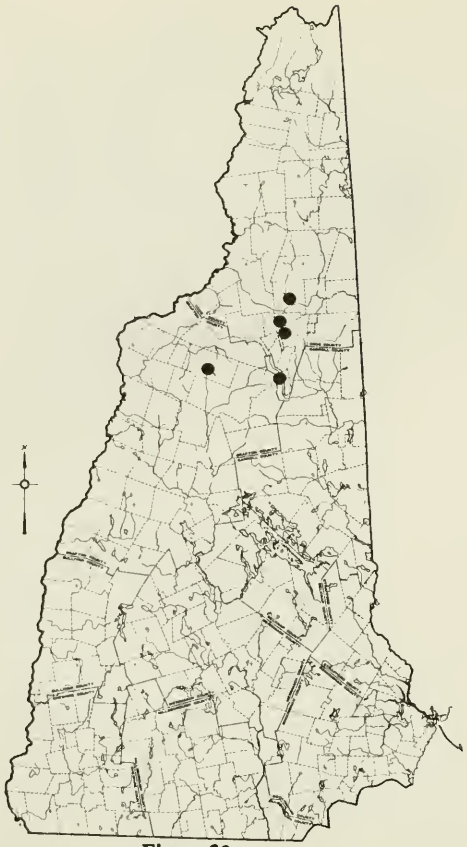

Figure 30
Poa fernaldiana

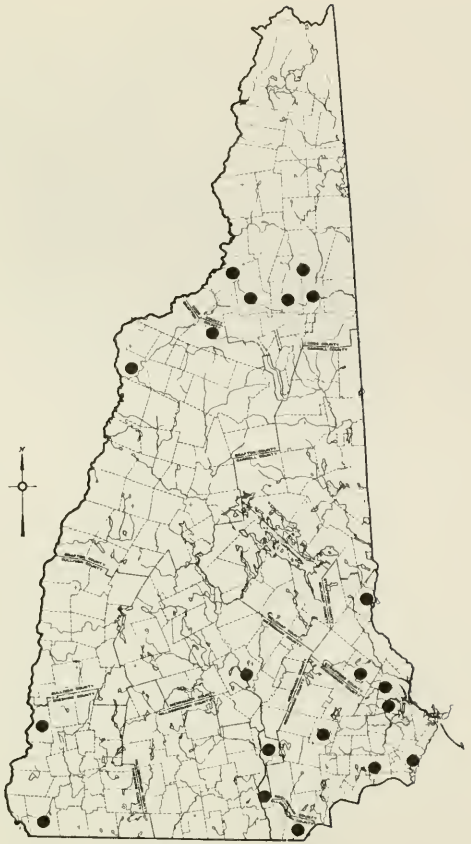

Figure 31
Eragrostis pectinacea

8. BRIZA Quaking Grass

A small genus of grasses native to Europe sometimes planted in the U.S. as ornamentals.

1. *Briza media* L.

Perennial. Cultivated and sometimes escaping to fields. Very rare; known from 3 stations (Randolph, Coos Co.; Windham, Rockingham Co.; Nelson, Cheshire Co.). Introduced.

9. DACTYLIS Orchard Grass

A common large, coarse grass of fields with spikelets crowded into laterally flattened, asymmetrical clusters of ascending inflorescence branches.

1. *Dactylis glomerata* L.

Perennial. Fields, roadsides and waste places. Common throughout N.H. Introduced from Europe. (Including var. *ciliata* Peterm. and var. *detonsa* Fries).

10. ERAGROSTIS Love Grass

Bunchgrasses with mostly panicles, resembling *Poa* but having spikelets usually longer, with more florets, often reddish or grayish. Lemmas keeled, awnless. Several species introduced.

Gould (1968) places the genus in the Tribe Eragrosteae, subfamily Eragrostoideae.

A. Stems creeping, forming low mats ..... *E. hypnoides*
A. Stems mostly erect or ascending
  B. Plants perennial; tuft or pilose hairs in axil of primary inflorescence branches; spikelets reddish ..... *E. spectabilis*
  B. Plants annual; lacking tuft of hairs in axil of primary inflorescence branches; spikelets lead-colored or drab at maturity
    C. Blades glandular or warty along the margin ..... *E. cilianensis*
    C. Blades lacking glandular or warty margins
      D. Culms branching only at base ..... *E. capillaris*
      D. Culms branching from middle or above
        E. Auricles of sheaths of upper leaves glabrous ..... *E. multicaulis*
        E. Auricles of sheaths of upper leaves ciliate
          F. Spikelets mostly more than 5 mm long, usually more than 5 florets ..... *E. pectinacea*
          F. Spikelets 2-4 mm long, 2-5 florets ..... *E. frankii*

1. *E. hypnoides* (Lam.) BSP

Annual. Shores, Connecticut River Valley. Rare (known only from Hanover).

2. *E. cilianensis* (All.) Hubbard Skunk-, Stink- or Snake Grass

Annual. Waste places and disturbed ground. Throughout N.H., infrequent. Naturalized from Europe.

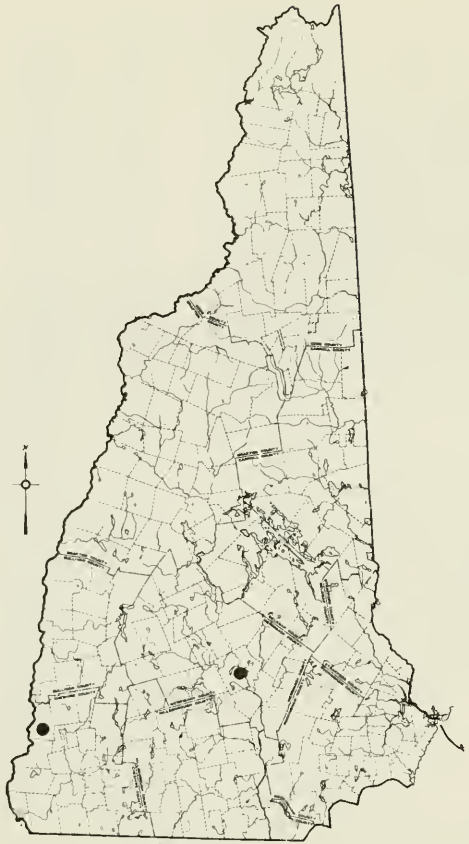

Figure 32
Eragrostis frankii

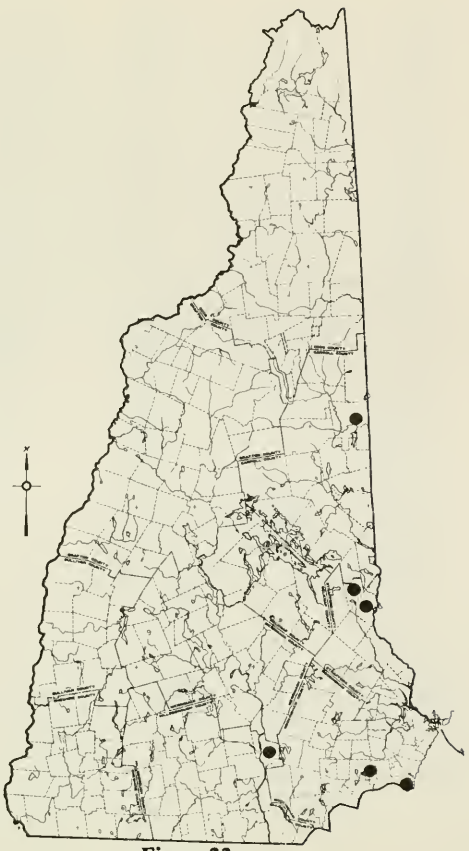

Figure 33
Eragrostis capillaris

The widely known name *E. megastachya* (Koel.) Link was retained by Fernald (1950). For discussion of nomenclature for the taxon see Shinners (1954) and Voss (1966).

3. *E. pectinacea* (Michx.) Nees (figure 31)

   Annual. Railroads, roadsides, waste places and sandy river margins. Throughout N.H.; infrequent.

4. *E. multicaulis* Steud.

   Annual. Along railroads, roadsides and waste places. Scattered in the state; infrequent. Introduced from Europe.

5. *E. frankii* C. A. Mey. (figure 32)

   Annual. Sandy banks of rivers. Rare along lower parts of Merrimack and Connecticut Rivers.

6. *E. capillaris* (L.) Nees (figure 33)

   Annual. Sandy shores, dry sandy sites and railroad ballast. Infrequent in southeastern N.H. and rarely introduced northward.

7. *E. spectabilis* (Pursh) Steud. Tumblegrass; Petticoat-Climber (figures 34 and 35)

   Perennial. Open dry sites. Frequent in southern N.H., ranging northward along the Connecticut River Valley.

   Variety *sparsihirsuta* Farw. does not separate out well in our state.

11. TRIDENS Purpletop

A single species in New Hampshire; a tall attractive grass with distinctive purple spikelets.

Gould (1968) places the genus in the tribe Eragrosteae, subfamily Eragrostoideae.

1. *Tridens flavus* (L.) Hitchc. Purpletop, Tall Redtop

   Perennial. Old fields and edges of woods. Central and southeastern N.H.; rare. Possible adventive in N.H. from further south.

   Our specimens all have purplish inflorescences and have been called forma *cuprea* (Jacq.) Fosberg. The species is sometimes included in the austral genus *Triodia* (cf. Fernald, 1950; Gleason, 1963; Seymour, 1969).

12. TRIPLASIS Sand Grass

A small genus with a single species in New Hampshire; a small wiry grass of dry sandy sites; coastal.

Gould (1968) places the genus in the tribe Eragrosteae, subfamily Eragrostoideae.

1. *Triplasis purpurea* (Walt.) Chapman

   Annual. Sandy seashores. Known only from one station (Little Harbor, Rye; 2 collections made in 1901) and may no longer exist in our state.

Figure 34
Eragrostis spectabilis

13. CYNOSURUS Dogtail

Small genus of tufted grasses with two kinds of spikelets, fertile and sterile, in dense clusters.

1. *Cynosurus cristatus* L.

Perennial. Old fields. Rare, known from only two stations (Randolph, Coos Co.; Peterborough, Hillsboro Co.). Introduced from Europe; sometimes used in pasture grass mixtures.

14. DISTICHLIS Spike Grass

A small genus of halophytes with rather large, spike-like panicles; leaves 2-ranked, stems mostly hidden by overlapping leaf sheaths.

Gould (1968) places the genus in the tribe Aeluropodeae, subfamily Eragrostoideae.

1. *Distichlis spicata* (L.) Greene (figures 36 and 37)

Perennial. Saltmarshes. Coastal N.H.; frequent.

Our plants belong to var. *spicata.*

15. PHRAGMITES Reed

A large rhizomatous grass, 2-6 meters tall, leaves broad; inflorescence large, plume-like; rachis bearded with long silky hairs.

The genus *Phragmites* is placed in the tribe Arundineae, subfamily Arundinoideae by Gould (1968).

1. *Phragmites australis* (Cav.) Steudel (figure 38)

Perennial. Brackish swampy areas, edges of saltmarshes and occasionally in freshwater marshes. Frequently in coastal areas, occasional inland in southern New Hampshire. Tending to spread along new highways.

Although long known as *P. communis,* Clayton (1967), 1968) has shown that *P. communis* and *P. australis* are conspecific and that *P. australis* is the earliest correct name.

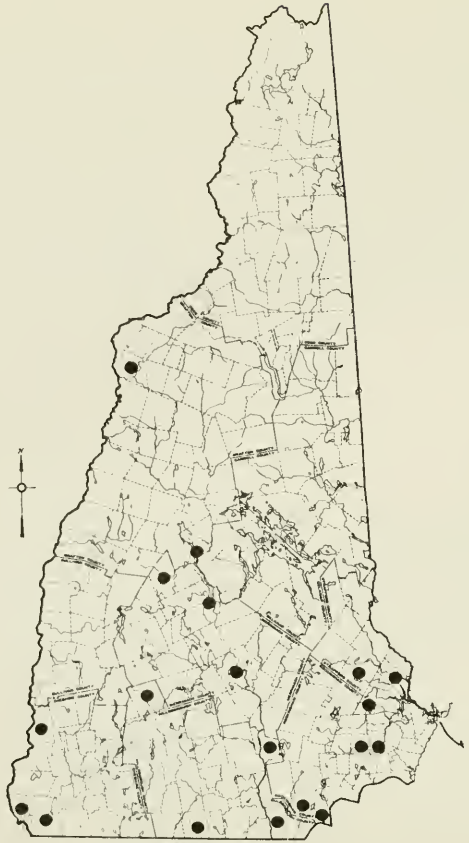

Figure 35
Eragrostis spectabilis

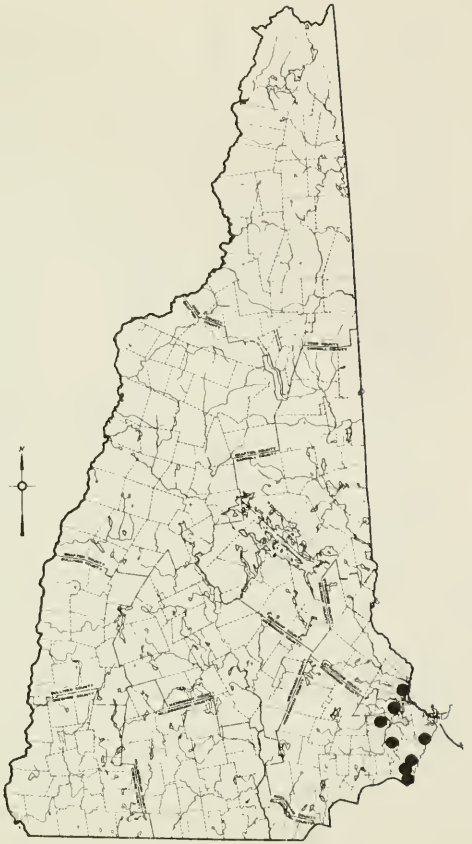

Figure 36
Distichlis spicata

Figure 37
Distichlis spicata

II. TRITICEAE (HORDEAE)

A. Spikelets solitary at each joint of rachis
  B. Spikelets inserted on two sides of 3-sided rachis (usually appearing 1-sided) ..... 1. *Nardus*
  B. Spikelets alternating on opposite sides of rachis
    C. Spikelets inserted edgewise toward flat rachis ..... 2. *Lolium*
    C. Spikelets with broadside toward flat rachis
      D. Glumes less than 2.5 mm broad, perennials (weeds or native) ..... 3. *Agropyron*
      D. Glumes greater than 4 mm broad, cultivated annuals
        E. Glumes 3-nerved, rounded back, lemma rounded, long-awned or awnless; rarely cultivated ... 4. *Triticum*
        E. Glumes 1-nerved, keeled, lemma sharply keeled, tapering to long awn; occasionally cultivated and commonly planted on roadbanks ..... 5. *Secale*

A. Spikelets more than 1 at each joint of rachis
  F. Spikelets 3 at each joint of rachis, lateral pair sterile and reduced to long awns ..... 6. *Hordeum*
  F. Spikelets 2 at each joint of rachis
    G. Spikelets well separated, nearly perpendicular to stem, glumes reduced to 2 short bristles or lacking ..... 7. *Hystrix*
    G. Spikelets dense, ascending, glumes equalling the florets ..... 8. *Elymus*

1. NARDUS — Mat Grass

Small grass with one-flowered spikelets in slender, terminal spikes; spikelets inserted on two sides of 3-sided rachis, thus sometimes appearing 1-sided. Genus with a single species, placed in the tribe Nardeae by Gould (1968).

1. *Nardus stricta* L. — Mat Grass

Old fields and pastures. Introduced from Europe. Rare in N.H. Known from Sandwich, Carroll Co.; Waterville, Grafton Co.; Andover, Merrimack Co., and Sharon, Hillsboro Co.

2. LOLIUM — Darnel

Inflorescence condensed into a thin spike with spikelets inserted edgewise toward the flat rachis. Weedy, introduced from Europe.

A. Glumes nearly as long as spikelets; lemmas without awns ..... *L. perenne*
A. Glumes much shorter than spikelet; lemmas awned ..... *L. multiflorum*

1. *L. perenne* L. — Common Darnell, Ryegrass

Perennial of lawns and roadsides; occasional weed. Introduced from Europe.

2. *L. multiflorum* Lam. — Italian Ryegrass

Annual of dooryards, fields and waste areas; occasional weed. Introduced from Europe.

L. perenne has long been cultivated as a forage grass and has given rise to several agricultural strains. *L. multiflorum* is sometimes regarded as one of these and treated as *L. perenne* var. *aristatum* Wills. Terrell (1968) recognizes intergradation between the two taxa, but he prefers to treat them as separate species.

3. AGROPYRON Quack Grass, Witchgrass

Coarse, medium to large grasses with flattened terminal spikes; spikelets with broadside toward flat rachis. Widespread introduced weeds and less common native grasses of rocky woods and ledges.

A. Culms tufted or solitary, lacking creeping rhizomes; florets readily disarticulating at maturity (empty glumes frequently present); anthers 1-2.5 mm; plants native, occurring in rocky woods and on ledges ..... *A. trachycaulum*

A. Culms tufted or solitary, with elongate, creeping rhizomes; florets seldom readily disarticulating; anthers 3-7 mm; plants introduced, weedy.

B. Cartilaginous belt (non-green) at nodes half or less as long as its diameter; glume gradually tapering, usually from below the middle, to a short, straight awn; glume margins minutely ciliate toward base; rhizome grayish ..... *A. smithii*

B. Cartilaginous belt at nodes nearly or fully as long as its diameter; glume somewhat abruptly tapering, usually from above its middle, to a short straight awn; glume margins lacking cilia toward the base (often entirely glabrous); rhizomes yellowish (sometimes nearly white) ..... *A. repens*

1. *A. trachycaulum* (Link) Malte (figure 39) Wheatgrass

Rocky woods, talus and ledges. Infrequent in N.H. and rare in the southern part of the state. A very variable species with three varieties recognized in N.H.

a. Awns lacking or short, less than half the length of the lemma.

b. Glume 10-16 mm long; mature spike 5-12 mm thick ..... var. *majus* (Vasey) Fern.

b. Glume 7-10 mm long; mature spike 3-6 mm thick ..... var. *novae-angliae* (Scribn.) Fern.

a. Awns long, equal to or more than the length of the lemma ..... var. *glaucum* (Pease & Moore) Malte

Intergradation between all varieties occurs, particularly between var. *novae-angliae* and var. *majus,* but the latter is more northern in distribution. Bowden (1965) does not regard var. *majus* worthy of nomenclatural recognition. However, this entity appears to be sufficiently distinct in N.H. and we are swayed to recognize the taxon. Variety *glaucum* appears to be the most distinct taxon and is segregated by some authors as a distinct species, *A. subsecundum* (Link) Hitchc. (Hitchcock, 1951; Hultén, 1968).

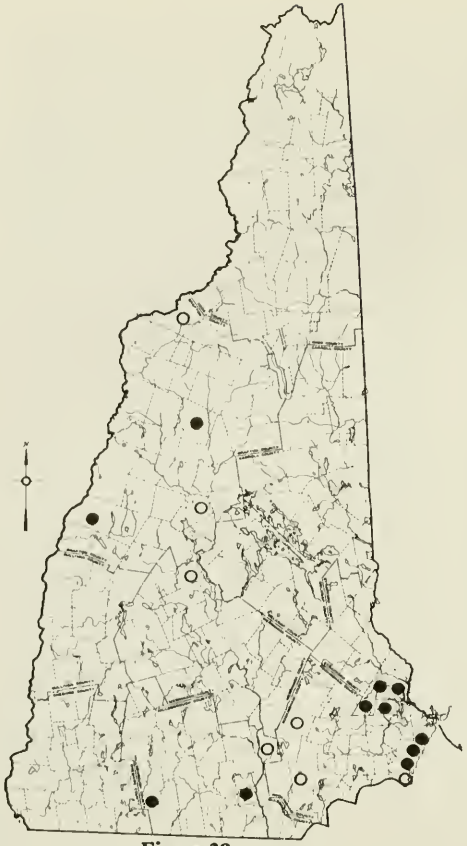

Figure 38
Phragmites australis

Figure 39
Agropyron trachycaulum

2. *A. smithii* Rydb. Western Wheatgrass

This western species is adventive eastward along railroads. Rare and perhaps not persisting in the state. Reported by Pease (1964) on railroad ballast, Milan in 1920 (*Pease 17826,* GH!).

3. *A. repens* (L.) Beauv. Quack Grass, Witchgrass

Weedy in cultivated lands, waste places, roadsides, and old fields. Common throughout. Introduced from Europe. Two varieties and several forms have been given nomenclatural recognition. However, intergradation is great and these entities are difficult to discern.

Agropyron pungens (Pers.) R. & S., an introduced species from Europe, has been collected along the coast in Maine at Cape Elizabeth, Cumberland Co. and Old Orchard Beach, York Co. and in Massachusetts at Cape Ann, Essex Co., and Cape Cod, Barnstable Co. Although this species has not, as yet, been reported from the coast of N.H. it might be expected to spread here.

4. TRITICUM Wheat

Dense erect spikes; spikelets in 2 rows, plump; glumes 3-nerved; lemmas long awned (erect) or awnless.

1. *Triticum aestivum* L. Wheat

Cultivated annual. Formerly much cultivated in the state. Now rare, occurring sporadically in cultivated areas and waste places. Both long-awned (bearded wheat) and awnless strains may be found.

5. SECALE Rye

Dense, erect spikes; spikelets in 2 rows, glumes distinctly 1-nerved, keeled; lemmas sharply keeled, tapering to long coarse awn.

1. *Secale cereale* L. Rye

Cultivated annual. Widely planted as soil stabilizer along roadbanks, persisting for a short time.

6. HORDEUM Barley

Tufted grasses with dense, terminal spikes; spikelets 3 at each rachis node; lateral spikelets (in ours) sterile, with glumes setaceous.

1. *Hordeum jubatum* L. (figure 41) Squirrel-tail Grass

Distinctive due to its dense spike and long awns and bristle-like glumes (4-7 cm) of lateral spikelets giving a "squirrel's tail" appearance. An infrequent grass, mostly occurring in coastal saltmarshes, where it is presumably native; rarer inland, as an adventive weed in open ground and cultivated fields. It may be expected to spread along highways. This species is considered a troublesome weed in many parts of the country as the mature, long-bristled, sharp spikelets readily disarticulate, becoming lodged in nostrils and injure mouths of livestock and work their way into ears of dogs.

A *Hordeum* with shorter setaceous glumes (less than 2 cm) has been reported from two localities in the state, Gorham, Coos Co. (Pease, 1964) and Madbury, Strafford Co. This taxon is referable to *H. jubatum* subsp. *breviaristatum* Bowden (treated by some authors as *H.*

Figure 40
Agropyron trachycaulum
var. *novae-angliae*

Figure 41
Agropyron repens

Figure 42
Hordeum jubatum

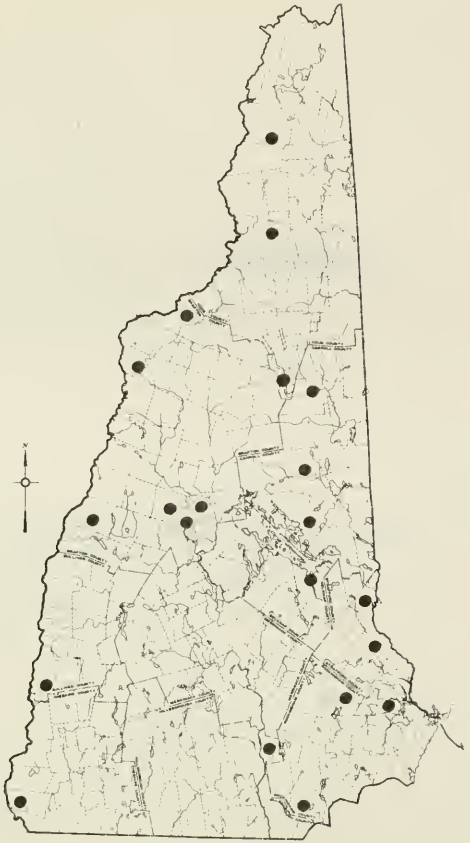

Figure 43
Hystrix patula

brachyantherum Nevski or *H. nodosum* var. *boreale* (Scribn. & Smith) Hitchc. This western taxon is rare and adventive in the east.

7. HYSTRIX Bottlebrush Grass

Inflorescence a large, loosely flowered spike, the spikelets in pairs, well separated, horizontally spreading at maturity (ours), up to 2 cm long, including the awn.

1. *Hystrix patula* Moench (figures 43 and 44) Bottlebrush Grass

Wooded talus, rich rocky woods and alluvial forests. Uncommon, occurring scattered throughout the state.

A form with pubescent lemmas (f. *bigeloviana* (Fern.) Gl., sometimes treated as var. *bigeloviana* (Fern.) Deam) is found with about the same degree of frequency, with no geographical or ecological distinction.

Natural hybridization between sympatric *Elymus canadensis* var. *canadensis* and *Hystrix patula* has been postulated by Church (1954, 1967), and both Church and Bowden (1964) place the latter in the genus *Elymus,* as *E. hystrix* L.

8. ELYMUS Wild Rye

Large grasses with dense, bristly spikes; spikelets in pairs at each rachis node. Native grasses of wet woodlands, riverbanks and shores.

A. Plants spreading, with coarse rhizomes; lemmas without awns, tapering to narrowly acute apex (occasionally appearing short-awned) ..... *E. mollis*

A. Plants with culms tufted, rhizomes lacking; lemmas with awns nearly always present.

B. Awns of lemmas straight, more or less erect at maturity or very occasionally lacking; body of glume at least twice the length of its awn.

C. Glumes 0.8-2 mm wide, flat but stiff; spike erect; leaves 3-13 mm wide ..... *E. virginicus*

C. Glumes narrow, bristle-like, less than 0.8 mm wide; spike arching; leaves 10-20 mm wide ..... *E. riparius*

B. Awns of lemmas arching outward at maturity; body of glume shorter than or equal in length to its awn.

D. Leaves 13-24 mm wide, flat at tips or slightly involute; glumes (0.5-) 1.0-2.0 mm wide ..... *E. wiegandii*

D. Leaves 5-15 mm wide, involute at tips; glumes 0.3-0.7 (-1.0) mm wide ..... *E. canadensis*

1. *E. mollis* Trin. (figure 45) Dune Grass

Rocky shores and sandy beaches. This northern species reaches its southern limit on Cape Cod, Massachusetts. We regard it as very rare and perhaps now extinct in N.H., as it apparently has not been collected in the state since 1895 *(Eaton s.n.,* 1895, NEBC).

Figure 44
Hystrix patula

Figure 45
Elymus mollis

Figure 46
Elymus virginicus

This taxon is sometimes referred to as *Elymus arenarius* var. *villosus* Mey. (cf. Fernald, 1950). Bowden's (1957, 1964) cytotaxonomic studies of this complex show that both taxa are deserving of species rank. *Elymus arenarius* is a species of northern Europe, while *E. mollis* occurs from Iceland and Greenland, across northern North America to northeastern Asia. Bowden recognized three subspecies, one in northeastern Asia and two in North America. Our plants are referable to subsp. *mollis* var. *mollis*.

2. *E. virginicus* L. (figure 46)

Alluvial woods, riverbanks and coastal shores. Frequent throughout the state. A rather variable species with several named varieties and forms.

Most of our material is referable to var. *virginicus*. The character "upper sheath inflated, enclosing the base of the spike" used in some keys to distinguish var. *virginicus* from other varieties is not totally reliable and Bowden (1964) points out that the type specimen has the spike clearly exserted. Variety *halophilus* (Bickn.) Wieg., a coastal plant, appears to be distinct, having spikelets pale, greenish-white and leaves often involute. Variety *jejunus* (Ramaley) Bush does not appear to be distinct from var. *virginicus*. Bowden regards neither var. *halophilus* nor var. *jejunus* as worthy of taxonomic recognition and lumps them under var. *virginicus*. Only one N.H. specimen of var. *glabriflorus* (Vasey) Bush has been seen (*Batchelder s.n.*, 11 Sept. 1902, Manchester, NHA).

3. *E. riparius* Wieg.

Alluvial woods, occasionally on wooded slopes. Infrequent, scattered at lower elevations through many parts of the state.

4. *E. canadensis* L. (figure 47)

Alluvial woods and riverbanks. Occasional in central and southern parts of N.H. Variable in pubescence; lemmas may be glabrous to scabrous or villous-hirsute.

5. *E. wiegandii* Fern. (figure 48)

Rich or alluvial woods and riverbanks. Infrequent, in northern N.H., south along the Connecticut River. Variable in pubescence; lemmas may be glabrous to scabrous or villous-hirsute.

This species sometimes appears to intergrade with the closely related *E. canadensis*. The taxon is treated by some authors as *E. canadensis* var. *wiegandii* (Fern.) Bowden. However, evidence from hybridization studies of Church (1967) supports recognition at the species level.

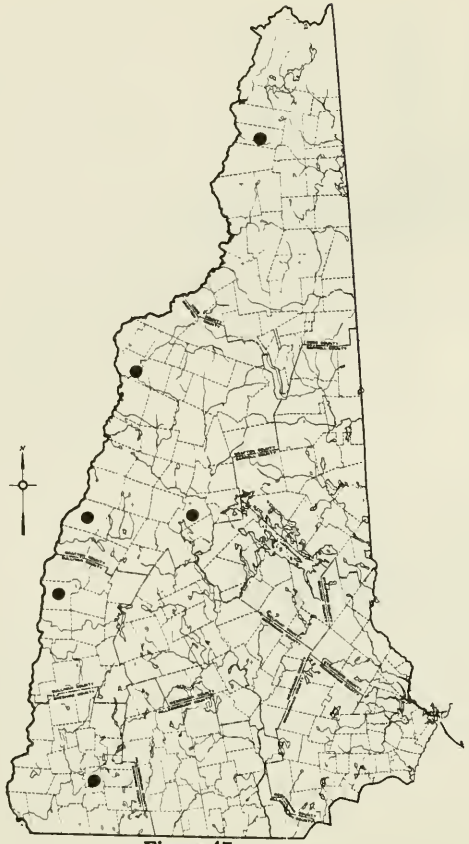

Figure 47
Elymus canadensis

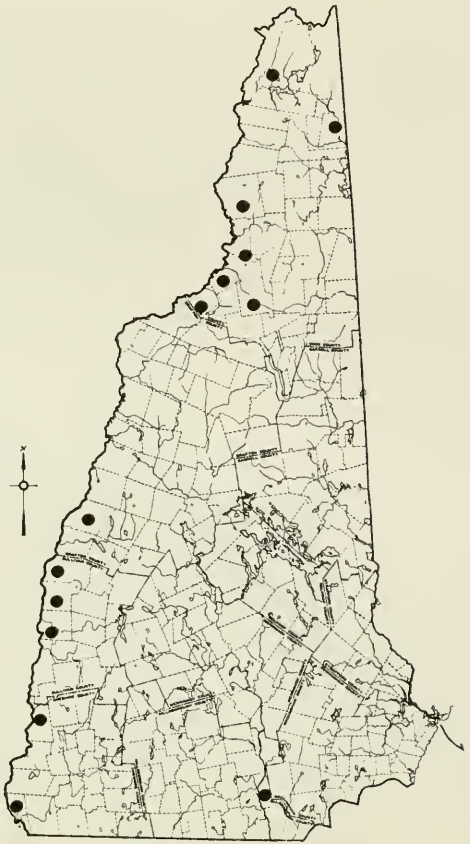

Figure 48
Elymus wiegandii

LITERATURE CITED

Baum, B. R. 1967. Kalm's specimens of North American grasses: their evaluation for typification. Canad. J. Bot. 45: 1845-1852.

Bowden, W. M. 1957. Cytotaxonomy of sect. *Psammelymus* of the genus *Elymus*. Canad. J. Bot. 35: 951-993.

———. 1964. Cytotaxonomy and interspecific hybrids of the genus *Elymus* in Canada and neighboring areas. Canad. J. Bot. 42: 547-601.

———. 1965. Cytotaxonomy of the species and interspecific hybrids of the genus *Agropyron* in Canada and neighboring area. Canad. J. Bot. 43: 1421-1448.

Church, G. L. 1949. A cytotaxonomic study of *Glyceria* and *Puccinellia*. Amer. J. Bot. 36: 155-165.

———. 1954. Interspecific hybridization in eastern *Elymus*. Rhodora 56: 185-197.

———. 1967. Taxonomic and generic relationships of eastern North American species of *Elymus* with setaceous glumes. Rhodora 69: 121-162.

Clausen, R. T. 1952. Suggestion for the assignment of *Torreyochloa* to *Puccinellia*. Rhodora 54: 42-45.

Clayton, W. D. 1967. Studies in the Gramineae: XIII. Kew Bull. 21: 99-110.

———. 1968. The correct name of the common reed. Taxon 17: 168-169.

Fernald, M. L. 1950. Gray's Manual of Botany. 8th ed. American Book Co., New York.

Gleason, H. A. 1952. New Britton and Brown Illustrated Flora of the Northeastern United States and adjacent Canada. Vol. I. Hafner Publ. Co., New York.

Gould, F. W. 1968. Grass Systematics. McGraw-Hill Book Co., New York.

Hitchcock, A. S. 1935. Manual of the Grasses of the United States. U.S. Dept. Agric. Misc. Publ. 200.

———. 1951. Manual of the grasses of the United States. 2nd. ed. Revised by Agnes Chase. U.S. Dept. Agric. Misc. Publ. 200.

Hultén, E. 1962. The Circumpolar Plants. I. Vascular Cryptogams, Conifers, Monocotyledons. Kungl. Sven. Vet. Handl. Bd. 8.

———. 1968. Flora of Alaska. Stanford University Press, Stanford, Calif.

McNeill, J. 1976. Nomenclature of four perennial species of *Bromus* in eastern North America, with a proposal for the listing of *B. purgans* L. as a rejected name under Article 69. Taxon 25: 611-616.

Pease, A. S. 1964. A Flora of Northern New Hampshire. New England Botanical Club, Inc., Cambridge, Mass.

Seymour, F. C. 1969. The Flora of New England. Charles E. Tuttle Co., Rutland, Vt.

Shinners, L. H. 1954. Notes on North Texas Grasses. Rhodora 56: 25-38.

Terrell, E. E. 1968. A taxonomic revision of the genus *Lolium*. Techn. Bull. U.S.D.A. 1392.

Voss, E. G. 1966. Nomenclatural notes on Monocots. Rhodora 68: 435-463.

———. 1972. Michigan Flora. Part 1. Gymnosperms and Monocots. Cranbrook Institute of Science Bull. 55. Bloomfield Hills, Mich.

Wagnon, H. K. 1950. Nomenclatural changes in *Bromus*. Rhodora 52: 209-215.

———. 1952. A revision of the genus *Bromus*, sect *Bromopsis*, of North America. Brittonia 7: 415-480.

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